Advanced insulation Materials for Cryogenic Propellant Storage Applications, Phase I

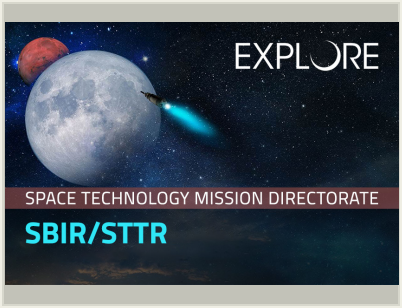
Completed Technology Project (2007 - 2007)

Project Introduction

Advanced Materials Technology, Inc (AMTI) responds to the Topic X9 entitled "Propulsion and Propellant Storage" under subtopic X9.01, "Long Term Cryogenic Propellant Storage, Management, and Acquisition". The proposed program will focus on developing new multifunctional insulation materials that will impact cryogenic systems for space transportation orbit transfer vehicles, space power systems, spaceports, spacesuits, lunar habitation systems, robotics, and in situ propellant systems. These innovative materials will be capable of retaining structural integrity while accommodating large operating temperatures ranging from cryogenic to elevated temperatures conditions. These advanced materials can be incorporated into thermal protection systems (TPS), reducing the amount of TPS and its structure. To meet and exceed the NASA's requirements, we propose to develop multifunctional organic/inorganic nanocomposites foams for structural and insulation applications offering affordable cost, lightweight, and high strength, low thermal conductivity, high thermal stability, and easy processability which will result in improved efficiency and reliability of the cryogenic systems. The approach proposed in this program will provide with more flexibility in designing cryogenic insulators. Once the feasibility of the concept of strong, lightweight cryogenic insulating materials is demonstrated in Phase I, we shall scale-up this concept in a Phase II program to meet the NASA's requirements.

Anticipated Benefits

Potential NASA Commercial Applications: The innovative foamed organic-inorganic materials can be used in a variety of commercial applications. These materials are expected to outperform polyimide foams in structural and insulation including shipbuilding, aircraft, and medical prosthetics. A major difficulty in the commercialization of polyimide nanocomposite is that the raw materials are still very expensive. The potential applications for the materials developed under this program: include (i) Flame retardant and fire protection. (ii) Thermal insulation, (iii) Acoustic insulation, (iv) Weight reduction, (v) Gaskets and seals, (vi) Vibration damping pads, (vii) Spacers in adhesives and sealant, (viii) Extenders, (ix) Flow/leveling aids.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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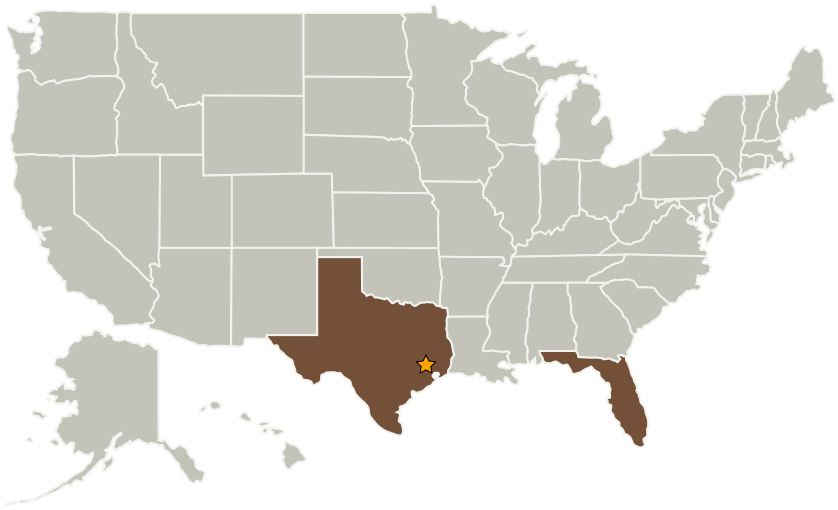
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Advanced Materials Technology, Inc.	Supporting Organization	Industry	Tampa, Florida

Primary U.S. Work Locations	
Florida	Texas

Project Transitions

January 2007: Project Start

July 2007: Closed out

Closeout Summary: Advanced insulation Materials for Cryogenic Propellant Sto rage Applications, Phase I Project Image

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Project Manager:
David M Ray

Principal Investigator:
Akbar G Fard

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.1 Cryogenic Systems
    - TX14.1.4 Ground Testing & Operations